

## Acute Traumatic Haemothorax

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**Abstract:** This is a retrospective study of 155 patients who sustained acute traumatic haemothorax, received and admitted to the thoracic and cardiovascular department at the Specialized Surgeries Hospital from October 1 st, 2016, till September 31 st, 2017. The patients were studied according to their age, gender, causative agents of trauma, and the management used for them till discharge, with the follow-up for complications. Our study was compared to another two studies, one from Turkey done from 1995 to 2003, taking only isolated traumatic haemothorax, and the other study was done here in Iraq but involving penetrating chest injuries from 2010 to 2011. Regarding the security circumstances of our country, there was an increase in penetrating trauma (61.3%) than blunt trauma (11.6%) in addition to blast injuries (27.1%). The injuries were more in males, in the 3rd decade of life, mostly from Baghdad. The traumatic haemothorax was evaluated and managed accordingly. Thoracostomy tube was the main treatment in 136 (87.7%) cases, and 19 cases needed urgent thoracotomy for different indications, mainly continuous chest tube drainage. Early and complete evacuation of traumatic haemothorax should be considered to prevent the development of complications, mainly empyema or fibrothorax, ending in a “trapped lung.”

**Keywords:** Haemothorax, Thoracostomy, fibrothorax.

## INTRODUCTION

Accumulation of blood within the chest, or haemothorax, is a relatively common problem, most often resulting from injury to intrathoracic structures or the chest wall. Haemothorax unrelated to trauma is considerably less common and can result from a variety of causes. Prompt identification and treatment of traumatic haemothorax is an essential part of the care of the injured patient [Mancini, M.C, 2008]. The aim of this study was to evaluate the systematic approach to the acute traumatic haemothorax.

Thoracic injuries have been discussed since the earliest medical writings. Breasted [Graeber, G.M, *et al.*, 2005], in his work on the Edwin Smith surgical papyrus, noted that 8 of the 43 injuries discussed were thoracic in nature. Although the papyrus dates to 3000 BC, successful management of thoracic injuries, particularly those of the chest wall, were carried out. Meade [Heidecker, J, *et al.*, 2006] in his volume on thoracic surgical history, he noted that Homer, in his description of the siege of Troy (950 BC), had graphically described the death of Sarpedon due to a penetrating thoracic wound. The lesson from this description is important for the practicing thoracic surgeon today. Withdrawal of a weapon or impaling an object from the thorax can cause exsanguinating hemorrhage because the object can be penetrating the heart or a great vessel [Gentry Wilkerson, R, *et al.*, 2010].

Chest injuries occur in approximately 60% of polytrauma cases; therefore, a rough estimate of the occurrence of haemothorax related to trauma in the United States approaches 300,000 cases per year [Nagarsheth, K, *et al.*, 2011]. In persons younger than 40 years of age, traumatic injury is the most common cause of death. Thoracic injuries are responsible for about one-fourth of the deaths, as pointed out by LoCicero and Mattox [Ebrahimi, A, *et al.*, 2014]. In the military trauma experience, many chest injuries are lethal before the patient reaches any sort of medical treatment facility, as pointed out by Seyfer and colleagues [Hyacinthe, A.C, *et al.*, 2018]. In the chest injury patient, with rare exception, the cause is either penetrating or blunt trauma, the latter mostly related to vehicular or pedestrian accidents [Mumtaz, U, *et al.*, 2012].

## MATERIALS AND METHODS

### Patient Sample

This is a retrospective study of 155 patients with acute traumatic haemothorax who were admitted, treated surgically, and followed up in the Department of Thoracic and Cardiovascular Surgery at the “Specialized Surgeries Hospital in the Medical City Complex “from October 1st, 2016, to September 31st, 2017.

### Study Design

This is a retrospective study of 155 patients with acute traumatic haemothorax who were admitted,

treated surgically, and followed up in the Department of Thoracic and Cardiovascular Surgery at the “Specialized Surgeries Hospital in the Medical City Complex “from October 1<sup>st</sup> 2016, to September 31<sup>st</sup>, 2017.

During this period of the 12 months, those 155 patients were received at the emergency department of “Medical City Complex,” 149 cases needed urgent management, and 6 cases were managed at Ibn Siena Hospital (By US. Medical Specialists). Both groups were referred & admitted later to the Department of Thoracic and Cardiovascular Surgery for further management and follow-up; all of the 149 patients were diagnosed clinically & by chest x-ray to have traumatic haemothorax; the other 6 cases were fully investigated, treated, and after stabilization was referred to the Medical City Hospital.

From those 155 patients, isolated traumatic haemothorax was found in 53 cases (34%), haemopneumothorax was found in 72 cases

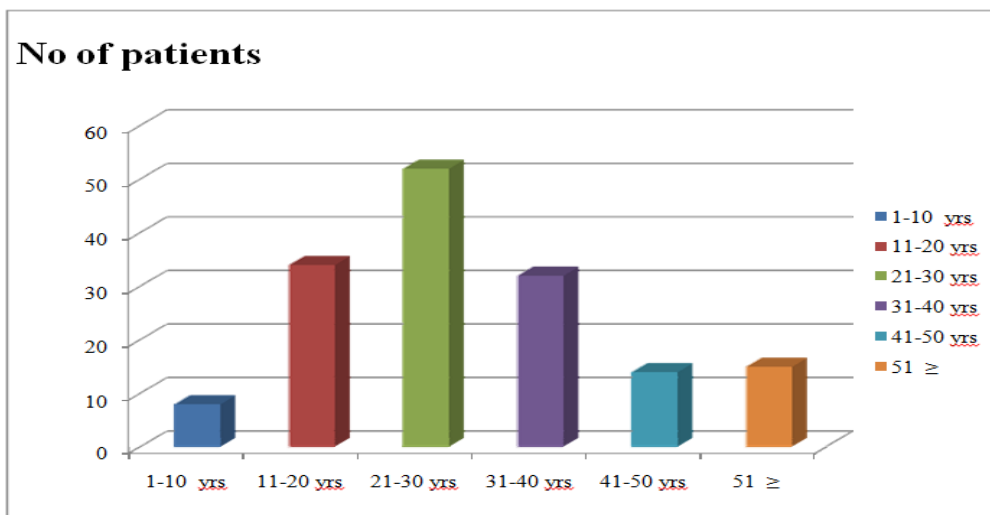
(46.4%), haemothorax associated with rib fracture in 11 cases (7%), haemothorax with flial chest in 3 cases (2%), haemothorax with abdominal injury in 7 cases (4.5%), haemothorax with orthopedic injury in 4 cases (2.5%), haemothorax with spinal cord injuries (manifested by paraplegia) in 5 cases (3.2%).

**Study Period**

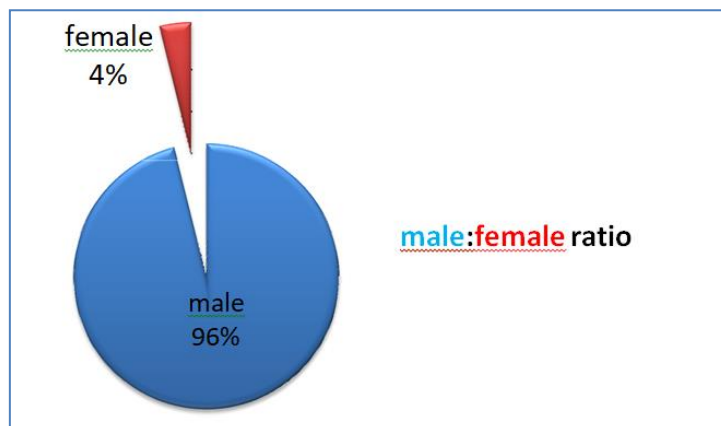
An agreement was made with the relevant committees in order to obtain the required licenses for this study, as the study period was for a full year and included following up on developments in addition to monitoring the patient and This study started from October 1st, 2016, to September 31st, 2017.

**AIM OF RESEARCH**

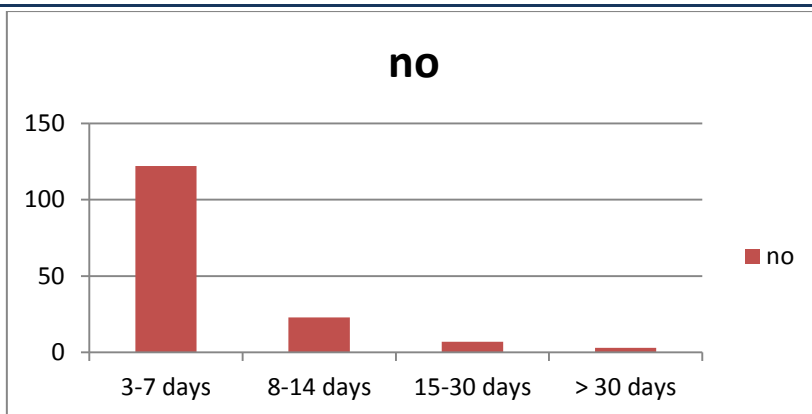
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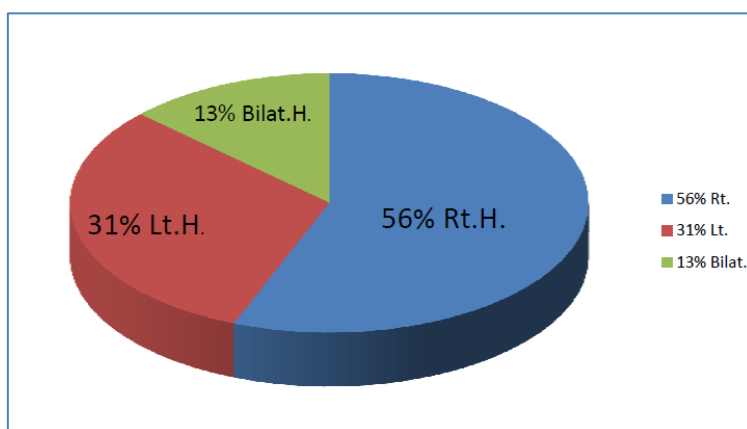
**Fig 1:** Distribution of patient according to age



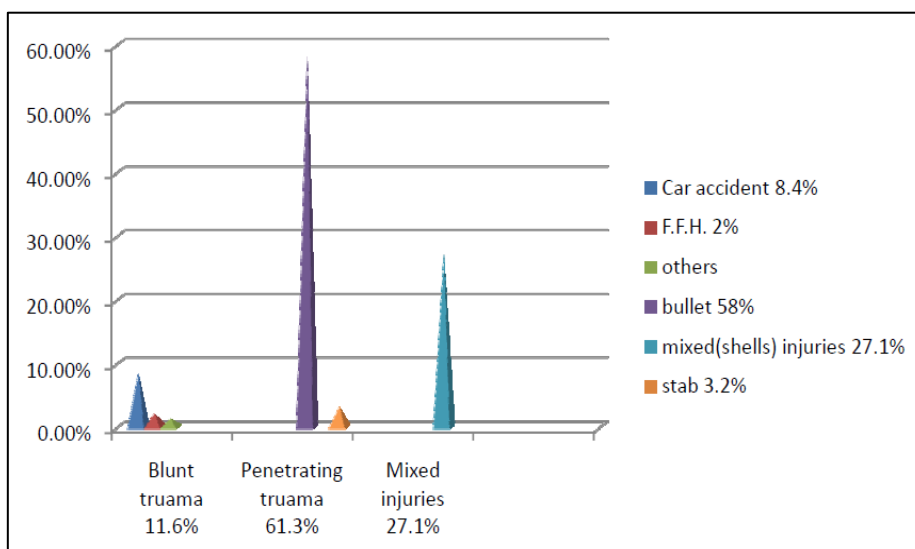
**Fig 2:** Distribution of patient according to sex



**Fig 3:** Distribution of patient according to Duration of admission



**Fig 4:** Distribution of patient according to traumatic haemothorax



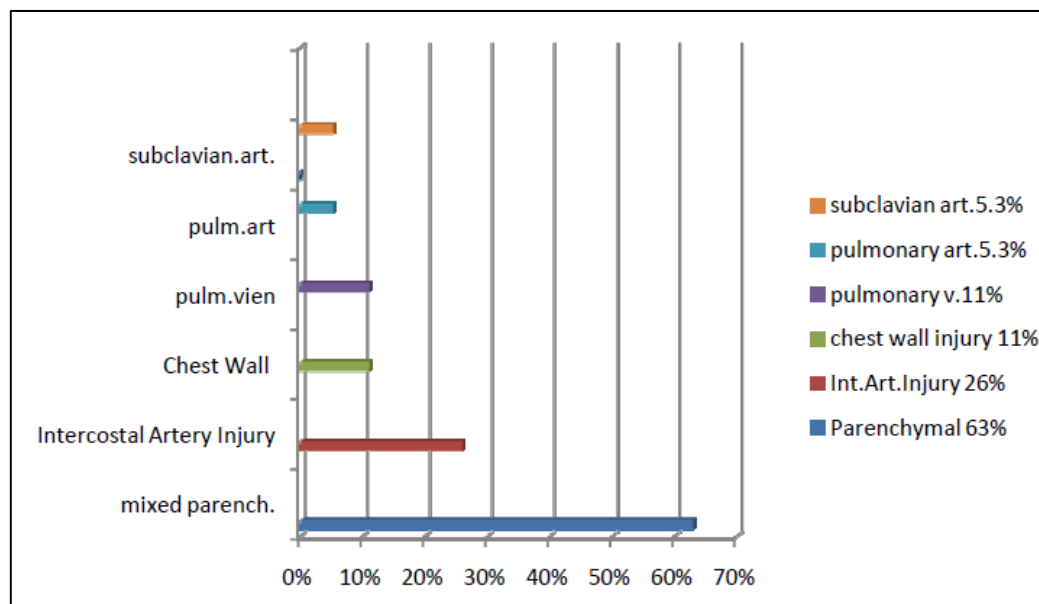
**Fig 5:** Etiological factors causing traumatic haemothorax

**Table 1:** Investigation done to patients with traumatic haemothorax

<i>Investigations</i>	<i>No. of Patients</i>
Lab Studies	155
Chest x-ray	155
Ultrasound	14
CT-Scan	20
Bronchoscopy	1

**Table 2:** Different surgical approach on admission

<i>Surgical Approach</i>	<i>No. of Patients</i>
1- Only Chest tube	136 (87.7%)
2- Emergency thoracotomy	15 (9.6%)
3- Thoracotomy+Sternotomy	2 (1.2%)
4- Thoracoabdominal	2 (1.2%)

**Figure 6:** Findings during Surgery

## DISCUSSION

Of the 155 patients, 149 (96.1%) cases were males, the other 6 (3.9%) cases were females, and the age distribution has no age-specific limit but shows that most affected cases were between 21-30 yrs (52 cases), the rest involve (8 cases) between 1-10 yrs, about (34 cases) between 11-20 yrs, (32 cases) between 31-40 yrs, (14 cases) between 41-50 yrs and (10 cases) above 50 yrs.

Regarding the duration of admission, most of the cases required less than seven days, and this is seen in 122 cases, while 23 cases required between 7-14 days, 7 cases stayed in the hospital for about one month, and 3 cases for more than a month and the right side of the chest was involved in 87 cases (56%), and the left in 48 cases (31%), and it was bilateral in 20 cases (13%).

Routine blood studies were performed on 149 patients, and a chest x-ray was diagnostic, and no further investigation was required. Eight cases (5.4%) required an ultrasound of the chest to assess the presence of collection in the pleural cavity. None of those patients have had a CT scan as an initial diagnostic tool, although CT- Scan was done in 14 cases (9.4%) for preoperative assessment as a result for complications following traumatic haemothorax. The remaining six patients

who were treated in Ibn Siena Hospital they were fully investigated by chest x-ray, ultrasound, and CT-scan, in addition to full lab studies (the full report was found in these cases referral forum). It is useful to mention that only one patient underwent a rigid bronchoscopic examination.

In individuals presenting the manifestations of an acute traumatic haemothorax, we must institute a method of treatment which will at once check and control the haemorrhage from the lung [Wightman, J.M, *et al.*, 2001]. The decision of exploration or conservative treatment must be made according to the patient stabilization status after the thoracostomy tube insertion [10]. The amount of blood initially obtained and the amount that continues to drain are important criteria for determining whether a thoracotomy is necessary [Heydari, M.B, *et al.*, 2014]. In our study, acute traumatic haemothorax is more common in males, and this could be explained by the fact that the majority of working personnel are males due to cultural & social traditions. This coincides with a similar study conducted by Cansever and his associates in 2005 in Turkey [Cansever, L, *et al.*, 2005].

Regarding the age, although everyone is exposed to trauma, most patients in our study were in the

third decade of life (52 cases), and this could be explained by the fact that this age group represents the working class of our society or the active part of the community and they were at risk in exposing to injuries, and also can be related to increase attacks by car explosions and bullets injuries by terrorists. It is worth mentioning that traumatic injury is the most common cause of death in persons below 40 years of age [Heydari, M.B, et al., 2014] in the United States of America.

Ultrasound has been developed to allow imaging of some intrathoracic structures using (Focused Assessment with Sonography for Trauma "FAST U/S"), which can be completed within minutes [Kasotakis, G, et al., 2017] as it appears in our study ultrasound used (in 8 cases) only, later on, to prove the presence of collection or clot in the pleural cavity so to determine the next step of management.

Most cases were managed by tube thoracostomy insertion initially and then assessed later for any possible indications to thoracotomy, and it appears that 136 cases (87%) were managed by chest tube insertion only and follow-up, while 19 cases (13%) major surgical intervention was needed in the acute stage, and this is compatible with other studies that reveal in 85% of traumatic haemothorax, a chest tube is sufficient, the remaining 15% require thoracotomy (2, 28).

In the remaining patient, thoracotomy was needed for the removal of the retained foreign body as shells and bullets causing repeated chest infections.

An early elective thoracotomy and decortications within a few hours or days after injury so as to control hemorrhage, evacuate a blood clot, permit and maintain immediate lung expansion and prevent the development of empyema or fibrothorax has been practiced by many but not adapted in this study [Pożgain, Z, et al., 2018].

## CONCLUSION

The decision of exploration or conservative treatment must be made according to the patient stabilization status after the thoracostomy tube insertion.

Multiple shells injuries (Blast injuries) are far more traumatic than other injuries.

The initial amount of blood drained should be considered in conjunction with the injury admission time interval in making a decision

regarding surgery. The rate of bleeding and the response to proper resuscitation thereafter form a better guideline.

Evacuation of blood clots from hemothoraxes must be attempted during the early posttraumatic stages, especially in cases refractory to classical drainage methods. These observations from our study and other mentioned studies indicate that early evacuation of blood by means of a tube thoracostomy is essential to minimize morbidity in acute traumatic hemothorax.

If continuing hemorrhage after tube thoracostomy occurs, there is a higher association of injury to additional vital structures.

Relatively few patients with primary pulmonary injury require thoracotomy; those that do are at significant risk and may require lung resection to control bleeding, haemoptysis, or to remove destroyed or devitalized lung tissue.

VATS is available in the thoracic Department of the Specialized Surgeries Hospital, and it should be used for the management of traumatic or post-traumatic haemothorax when indicated so as to reduce the incidence of formal surgical management with its related morbidity.

## RECOMMENDATIONS

In the trauma setting, it does not hold a primary role in the diagnosis of haemothorax but is complementary to chest radiography. Because many victims of blunt trauma do undergo a chest and/or abdominal CT scan evaluation, haemothorax not considered based on initial chest radiographs might be identified and treated.

Presently, a CT scan is of greatest value later in the course of the chest trauma patient for localization and quantification of any retained collections of clots within the pleural space.

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